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U.S. DEPARTMENT OF COMMERCE
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THE METRIC PATH TO GLOBAL MARKETS AND NEW JOBS:

A QUESTION-AND-ANSWER AND THEMATIC DISCUSSION

The logic for use of the metric system in the United States is strongest when metric use is viewed as an element of our national economic infrastructure, as an investment in efficiency, and as a necessity for international competitiveness.

Keywords: exports, global markets, international trade, metric, metric conversion, metric system, metric transition, metrication, standards, trade.

Why use the metric system?

By encouraging use of the metric system in U.S. trade and commerce, the Federal Government is helping U.S. industry gain advantages that will benefit the entire Nation. Exports have been responsible for most of our domestic economic growth in recent years. Exports are important for U.S. workers because each \$1 billion in merchandise exports supports almost 20,000 jobs, over seventy million Americans work in export-related jobs, and export-related jobs have higher than average pay. U.S. exports must compete in foreign markets where quality, cost effectiveness, and reliability are defined by international standards, including the metric system—which is the international standard for measurement. *By converting to use of the metric system in trade and commerce, U.S. industry can make its products more acceptable to foreign customers.* Our metric products will sell more easily in export markets, and that will lead to greater economic growth and more jobs in the United States.

What are the advantages of metric use for U.S. industry?

U.S. industry will gain increased access to growing world markets and a resulting increased ability to export, and it will benefit from improved efficiency and greater competitiveness, by using the metric system. Improvements in efficiency and competitiveness can result from the use of the same product standards for both domestic and foreign markets, the standardization of parts and part sizes, the ability to maintain smaller inventories, and the inherent simplicity of the metric system. These advantages will help U.S. industry to gain an even larger share of world markets and create even more new high-quality jobs.

What are the national benefits of metric use?

The entire Nation will benefit from the metric-driven economic expansion of U.S. industry, as well as from the creation of new jobs. In addition, the Nation will benefit from eliminating inefficiency in business and daily life that is caused by use of two different systems of measurement units. By adopting the metric system as the preferred system, education and training can be improved, especially mathematics and science education. This is one of the President's goals.

What has been the experience of U.S. firms that have converted?	<i>Business enterprises that converted to the metric system usually ended up saving money.</i> Frequently, metric conversion has been a means of standardizing and reducing the number of sizes of supplies and parts. Some U.S. companies that converted experienced increases in sales to unexpected new customers, particularly foreign-owned companies operating in the United States. Some companies reported lower costs from fewer mistakes and less rework because switching to decimal metric units simplified their work.
Why can't domestic industries stay nonmetric?	<i>Domestic industries that ignore global realities and continue to use nonmetric measures will find that they risk increasing their costs.</i> They risk limiting themselves to a smaller pool of nonmetric supplier firms, paying more for nonstandard parts and materials, and having to readjust or recalibrate metric equipment from other industries to nonmetric specifications. Nonmetric modular products and those that interface with outside-industry products are especially vulnerable to the added costs of adapting to a metric environment. Even in nonmetric domestic-only industries, metric standards are beginning to appear because national standards are being "harmonized" or brought into agreement with metric international standards.
What is influencing U.S. industries to be metric?	Most U.S. industries that do business abroad are already predominantly metric due to global sourcing of parts, service, components, and production. The remaining nonmetric U.S. industries are increasing their metric use for selected products and activities, or are being influenced by metrication in other industries. <i>Also, federal agency use of the metric system is encouraging firms that do business with the government to use the metric system.</i>
How would education benefit with the metric system?	The biggest benefit would come in mathematics. <i>Because there would be no need to spend as much classroom time on cumbersome conversions among units and on manipulating fractions, students could spend more time on learning mathematics.</i> Converting to metric use will also provide an opportunity to improve the entire mathematics curriculum and to use a simpler system of units throughout the educational program. Upon entering the work force, graduates would be better prepared to make metric products for the global marketplace and to provide metric services that can be more easily exported.
Why can't we keep using two measurement systems?	<i>It is much more efficient for business enterprises, industries, and nations to use a single measurement system instead of two.</i> For firms, using two measurement systems usually means two sets of tools, parts, and product specifications, as well as repeated conversions among units. It leads to higher overhead costs, such as when separate catalogs and package labels with metric units must be used for products sold overseas. Using two measurement systems industry-wide multiplies the inefficiencies suffered by individual firms. It adds uncertainty and potential confusion to industry standards and marketing, and it may lead to habitual unit conversions. Nationally, consumers face added difficulties in comparison shopping because of the variety of units. Also, many people, businesses, and organizations need two sets of tools.

Why do U.S. exports have to be metric?

Many of our products that are still not metric are not readily exportable. *In effect, we are imposing a trade barrier on our own goods.* International standards and the regulations of regional trading blocs require metric units for measurements because the metric system is the international standard of measurement. More importantly, customers in other nations have grown up with the metric system of measurement. Foreign customers are familiar with and expect—usually prefer—products made to metric measures. They are neither familiar nor comfortable with U.S. pints and ounces and inches and pounds. *On the shelves of shops in other nations, our inch-pound products are at a disadvantage.* In today's highly competitive world markets, any disadvantage quickly translates to lost sales and fewer exports. *This inevitably leads to less domestic economic growth, fewer new jobs, and a lower standard of living than we could otherwise enjoy.*

Why is the Federal Government involved?

The 1988 amendments to the Metric Conversion Act direct federal agencies to convert programs relating to trade, industry, and commerce to the metric system. The strategy is to use federal procurement, financial assistance, and other business-related activities to encourage and help U.S. firms to convert voluntarily to the metric system. The Act allows exceptions to federal metric use to avoid unintended harm to U.S. firms. For example, federal agencies are not required to use the metric system if it is "impractical or likely to cause significant inefficiencies or loss of markets to United States firms."

Another reason for government involvement is that just like energy, transportation, and telecommunications, our national measurement system is an important element of our economic infrastructure. Therefore, it is appropriate that the Federal Government has the Constitutional power to "fix the standards of weights and measures." When it amended the Metric Conversion Act, *Congress declared as U.S. policy that the metric system is the preferred system of weights and measures for trade and commerce.*

What can Government leadership accomplish?

Federal Government leadership and commitment can remove the remaining uncertainties about metric conversion and bring the "big picture" national benefits into focus. Many non-metric firms are willing to convert. However, they are looking to the Government to make it clear to their suppliers, customers, and competitors that the time has come to convert the entire Nation to metric usage. When the Government makes metric conversion a national priority, the business community will see the long-term benefits in efficiency and international trade deriving from metric conversion as economic issues it can support. Similarly, when the Government makes a visible commitment to metric conversion and explains the economic necessity, the public will understand the educational, economic, and competitive benefits, and will accept an orderly adoption of the metric system.

If metric conversion is good for business, why don't we let the free enterprise system decide?

By working with industry on metrication, federal agencies found no major barriers to the conversion of nonmetric U.S. industries. However, the federal agencies also found that some firms believe that U.S. customers may be unwilling to use the metric system. In actual experience, U.S. customers readily accepted metric beverage containers, automobiles, nutrition labeling, vitamins, and track and field events.

Some firms responded to a federal survey that they are unable to justify up-front investments in metric conversion because the benefits are diffuse and not immediate. Some said that they do not plan to convert because their current customers are not demanding metric products. Companies that do not export say that there is no need for them to change to metric units.

Although such views may appropriately reflect individual firms' assessments of their business environment, they do not reflect the national "big picture" economic benefits that can be gained from metric conversion. Also, such views do not reflect the hidden costs of using two measurement systems. Besides eliminating the costs of two measurement systems, the national benefits include removing the self-imposed trade barrier caused by a nonstandard measurement system. *Based upon the positive experiences of firms and industries that have converted, the federal agencies have concluded that widespread metric use will yield long-term benefits that are beyond any one-time costs or inconveniences.*

If the federal agencies are converting to metric, isn't that enough?

No matter how broad their national vision, the federal agencies cannot by themselves establish the metric system as the preferred system in trade and commerce. They ultimately need the support of private industry and the public. It may be time for additional steps to move the Nation out of its dual-system comfort zone and to continue national progress toward preferred metric use.

What are some of the next steps we could take?

Some possible next steps might include:

1. Greater Federal Government leadership and public articulation of the national vision.
2. Actions to encourage a broad national exchange on metric conversion.
3. Public forums to consider the interrelated interests and views of government, industry, and the public.
4. A broadly based campaign to increase awareness of the economic issues related to metric use and the application of metric measures in daily life.
5. Review and revision of existing nonmetric regulations, standards, and legislation.
6. Actions to identify and remove any impediments to metric use in industry and to minimize any potential adverse economic effects.

**Why do we
need any
next steps?**

Industry and the public may have reached a stable dependence on two measurement systems. The stability may be due to the perception that for the remaining nonmetric activities, temporary costs for changing to predominant metric use exceed expected benefits. The perception arises partly because the continuing costs of inch-pound use are invisibly absorbed by current accounting methods and partly because our existing dual-measurement-system economy is passively accepted by the public. *If the economic baseline were a more efficient single-system metric economy, then industry would see that short-term metric conversion costs are an investment that will reduce current costs and eventually provide a large return.* Cultural attitudes will have to change to eliminate the inch-pound measurement system from our economy.

LEADING METRIC THEMES

Theme: The isolated position of the United States as the sole nonmetric Nation.

Increasing U.S. exports and advancing U.S. participation in the global economy is hindered by our retention of an obsolete measurement system. The United States is the only industrialized nation that does not mainly use the metric system in its commercial and standards activities. The incompatibility between many U.S. standards and those used in world markets forces U.S. exporters to operate at a competitive disadvantage. The global economy requires an unimpeded flow of goods and investments and coordinated industrial processes among nations, as well as the use of a growing world database of industrial information. The metric system is the measurement system for products, processes, and information in international commerce. Nonmetric U.S. manufacturers, exporters, and investors are faced with a choice: continue to use a costly dual system of production (metric and nonmetric) or ask the world to make exceptions for our goods and investments. Can U.S. trade expansion proceed successfully in the face of such a difficulty? Isn't the real choice whether to adopt the metric system and succeed or to resist change and be left behind?

Theme: Demand of foreign customers for metric products.

Our trading partners are pressing us to meet their demand for products that conform to metric measures. For example, European Union regulations will require by the end of this decade that all products sold in Europe be labeled in metric units and all accompanying documentation be expressed in metric units. United States negotiations with Japan on trade issues are made more difficult by Japan's position that U.S. suppliers often fail to meet requirements for metric products. The U.S. policy that impediments to world trade, trade barriers, and trade discrimination must be eliminated is diminished by our own inability to meet the demand by the rest of the world that metric measures be used in world trade.

Theme: Widespread and growing adoption of metric standards by U.S. business.

Many U.S. businesses have already adopted metric standards. Today, almost half of all U.S. products are designed, built, and sold using metric specifications. Some entire industries make extensive use of metric units and produce metric products. Examples of metric U.S. products are: automobiles, tractors, electronic devices, computers, machine tools and other factory equipment,

ball bearings, munitions, off-road and earthmoving equipment, pharmaceuticals, photographic equipment, medical and health care equipment, and beverage containers. In addition, the U.S. scientific community uses metric units almost exclusively. Many U.S. industries have metric conversion under active consideration; they include commercial construction and aerospace. The growing number of economic opportunities in foreign markets, such as the Pacific Rim countries and the Eastern European countries from the former Soviet Union, are the driving force for metric conversion in these industries.

Theme: The need for U.S. businesses to replace their investments in production facilities with modern, world-class metric facilities.

Industry periodically replaces capital assets because of obsolescence, wear, changing market demand, and new technology availability. Firms often replace still-usable capital equipment with the newest world-class technology to improve productivity and economic performance. In many cases, it pays to switch to the latest technological innovations in equipment and facilities before the existing ones wear out. Replacement also offers an opportunity make changes that will respond to new industry directions and world standards. One of the best investments that a firm can make to conform to world standards is to convert to metric production. This will lead to opportunities for more active participation in foreign markets and for increased efficiencies through standardization of product lines.

Theme: Exclusive use of the metric system in research and applied technology.

Most research and development is conducted in metric units. U.S. industry uses research findings to develop new products. Moreover, the time lag between scientific discovery and market introduction of new products has decreased steadily. In many cases this time lag has declined from 5 or more years to only months. Another factor is the growing proportion of new products in a firm's output. Ten years ago, new products accounted for about 10 percent of the average firm's line of products; now it is around 30 percent. A technological, research-dominated economy can function more efficiently when metric measures are used in the entire product cycle: from research through commercialization to market introduction.

Theme: The unrealized market for scientific products and systems with metric designs.

The world market's relationship with technology is not limited to derived products. Many scientific systems and products are directly in demand for a great variety of purposes. Examples include laboratory facilities and systems for high technology production testing and controls, training and educational systems, scientific equipment for environmental and trace contaminant detection, and general scientific equipment for a variety of uses. Almost all scientific equipment and facilities are metric throughout the world and in the United States.

Theme: The need for the Federal Government to convert to the metric system to reinforce and complement metric use in the private sector.

The Federal Government's metric conversion of its programs has two facets. First, its conversion of regulations, grants, and procurement leads and encourages the private sector to adopt the metric system; and second, it must convert to keep up with and not inhibit those parts of the

private sector that are already using the metric system. Unfortunately, in some cases federal agencies lag the private sector. An example of this is the miles per gallon standards for automobile fuel consumption to reduce air pollution. By law, the standards must be stated in miles per gallon, even though automobiles in this country and abroad are almost exclusively metric. To express compliance with the statutes, the automobile industry must calculate the nonmetric values. Another example is the requirement to stamp gallons per flush and gallons per minute on bathroom fixtures. The salability of these items to foreign customers is compromised by the unfamiliar nonmetric markings.

Theme: Ease of computation in the metric system as an aid to the training of U.S. workers for new business opportunities.

Workers in training and retraining programs are pleasantly surprised to find that the metric system is easier to use than the inch-pound system they have always known. The inch-pound system requires the use of a variety of different numerical values (5280 feet per mile, 12 inches per foot, 3 feet per yard, 32 ounces per quart, 16 ounces per pound, etc.) that require tedious arithmetical calculation to convert from one to another. The metric system, on the other hand, operates in multiples of 10; conversion among units requires only the movement of a decimal point. Metric measurements remove one entire complicating area from training programs and permit more time and attention to be spent on the essential elements of industrial processes. Anything that eases the training of a highly skilled work force should be welcomed at this time when there is a national need for a larger number of better trained workers.

Theme: Standards, the Path to Global Markets.

International standards are becoming more important because world trade is becoming more competitive. Also, regional trading blocs are establishing bodies of regulations based upon international standards that define acceptable products within their borders. Products and services that are exported must comply with a growing number of standards and certification procedures. In the overwhelming majority of cases, metric measurements are used. U.S. industries that export incur additional costs when they must meet international standards that are incompatible with U.S. standards. By removing the obstacles to exporting that result from disparities between U.S. standards and international standards, the "harmonization," or bringing into agreement, of standards will significantly improve U.S. global competitiveness.

